Design and Development of Information-Based System for Quality Evaluation of "Five-dimension Education" of Class Collective in Colleges and Universities

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Abstract: The problem of educational evaluation is a major national plan that needs to be solved fundamentally. Colleges and universities, as the main front for meeting the needs of economic and social development and the education system for moral education, should deeply understand the new requirements for talents selection, training, and evaluation in the new era, adapt to social changes, and make reforms in talent evaluation. This thesis, based on the reform of "Five-dimension Education" evaluation of moral, intellectual, physical, and artistic labor for college students, makes the design and development of the "Five-dimension Education" quality evaluation information system for college class collectives, including the connotation and significance of class "Five-dimension Education" quality evaluation, the content of evaluation, the design of evaluation information system and the design function of four aspects.

Keywords: class collective, quality evaluation of "Five-dimension Education", information-based system

1. Introduction

Socialism with Chinese characteristics has entered a new era, endowed with a new connotation of "Five-dimension Education" in moral, intellectual, physical, and aesthetic work [1]. Schools at all levels and all types should closely follow the fundamental task of cultivating morality and cultivating socialist builders and successors with all-round development of morality, intelligence, physique, aesthetics, and labor. In order to fully implement the organization's education policy, firmly promote the "Five-dimension Education", creating a unique education model, colleges and universities are actively carrying out talent evaluation reforms. Now, taking the "Five-dimension Education" quality evaluation reform of students in a certain university as an example, the design and development of the "Five-dimension Education" quality evaluation system for the class group is carried out. The development of Five-dimension Education" quality evaluation work has become a direction with great exploration value.

2. Connotation and significance of "Five-dimension Education" quality evaluation of college class

2.1 The era significance of simultaneous development of "Five-dimension Education"

In China, fundamental goal of Education to cultivate socialist builders and successors with all-round development of morality, intelligence, physique, beauty and labor, and for the first time made clear that the basic quality requirements are the simultaneous development of "Five-dimension Education". In the new era, China deepens the education and teaching reform and comprehensively improves the quality of compulsory education. The Central Committee of the Communist Organization of China and the State Council issued the Opinions on Deepening Education and Teaching Reform and Comprehensively Improving the Quality of Compulsory Education. Thought on Socialism with Chinese Characteristics for a New Era, and fully implement the Organization's education policy, fulfill the fundamental task of fostering moral integrity and educating people [2], observe the laws of education, strengthen the basic role of teachers, and develop quality education around the work goals of uniting people's hearts, improving personality, developing human resources, cultivating talents, and benefiting the people. The simultaneous development of "Five-dimension Education" is the integration of "Five-dimension

Education" of moral, intellectual, physical, aesthetic and labor through "forging soul through moral education", "consolidate the foundation through intellectual education", "build body through physical education", "infiltrated in aesthetic education " and "exercise through labor education", promoting the integration of "Five-dimension Education", implementing the requirements of education evaluation reform, and cultivating socialist builders and successors who develop morally, intellectually, physically, aesthetically, and labor in an all-round way.

2.2 The connotation of "Five-dimension Education" quality assessment

Putting aside scores-oriented, entering higher education-oriented (postgraduate entrance examination rate), judging students based on scores, and mechanically applying evaluation indicators to measure students' images, but returning to the essence of evaluation, fundamentally establishing the concept of "students-oriented", and taking students' development as the purpose. Let "evaluation" promote the development of students, and students be evaluated can more clearly identify the problem and find their own direction of effort.

2.3 The significance of "Five-dimension Education" quality evaluation of class

Accelerating the construction of an education system with "Simultaneous Development of Five-dimension Education" in moral, intellectual, physical, aesthetic and labor development is the direction for the deepening of the reform and development of socialist higher education with Chinese characteristics in the new era, and it is also an action guide for the establishment of an ideological and political work system in colleges and universities [3]. The class collective is the basic unit of education, teaching and management in the school. It belongs to the grass-roots organization and is an important carrier for students to learn, live and grow. "Simultaneous Development of Five-dimension Education" is committed to seeking the overall reform of the educational ecology based on curriculum teaching, organizational management, and school culture, strengthening top-level design, and building a class collective evaluation system that not only helps students to reflect, self-evaluate, and compare and improve in a timely manner, but also can effectively guarantee the implementation and promotion of the "Simultaneous Development of Five-dimension Education", and then effectively strengthen the all-round development of students and improve students' comprehensive quality.

3. The content of "Five-dimension Education" quality evaluation of college classes

3.1 The overall thinking of class "Five-dimension Education" quality evaluation

Promoting the "professionalization" of the class committee's ability and improving the overall quality of the class committee, focusing on innovating the "5+" class management model, building a three-level linkage mechanism of "school-academy-class" to further strengthen the construction and management of classes. Promote the extension of class management work to the security and stability of the college, the construction of study style, and the creation of civilization, deeply integrate into the college's ideological and political work system, and build a new pattern of class management with model innovation, mechanism coordination and efficient operation.

3.2 The form of class collective "Five-dimension Education" quality evaluation

The evaluation form is based on the combination of result evaluation and process evaluation. Through the establishment of the "Five-dimension Education" quantitative evaluation index system for the collective moral, physical, and artistic labor. Establishing the "Five-dimension Education" evaluation committee -- including Organization Branch of school and Self-discipline Departments, responsible for the assessment of each class.

3.3 Evaluation of the specific implementation process of "Five-dimension Education" in class collectives

Assessments are divided into two categories: routine work and additional items. Regular work is graded monthly, and additional items are graded at the end of the semester; each class implements a quantitative assessment system, and grades will be ranked at the end of the semester.   Final class assessment score = monthly average score (60%) + additional item score (40%), the top 10% of the

grades will participate in the advanced group; the top 10% class will be evaluated as advanced class; the class, grade score in the bottom 10%, will not participate in the class category assessment in the following year, and the number of individual assessment assessment will be reduced by 50%. The average score of the class led by the instructor in the semester is converted into a percentage system, accounting for 80% of his/her evaluation score in the semester.

3.4 Class collectives "Five-dimension Education" evaluation of the main parameters of the assessment index system

The evaluation index system includes regular work evaluation and additional items. Among them, there are five first-level indicators in the routine assessment. After reviewing the materials and checking the supporting materials, points will be deducted according to the scoring standards, mainly including the daily management of the class; the work of the organization, the league, and the publicity; the construction of the three styles-- teaching style, learning style and working style; student activities; and other special tasks are completed condition. There are also five first-level indicators for additional projects. By reviewing the materials, viewing supporting materials, and adding points according to the scoring standards, including volunteer service; competition award-winning and student research.

4. Thoughts on the design of "Five-dimension Education" quality information evaluation system for university classes

4.1 The design of "Five-dimension Education" quality statistical information analysis module of university classes

Employing SQL language to display regular work assessment and statistical display of additional project information, for example, use sum to complete the calculation of the total number of students, the calculation of the total number of students in different colleges, and the calculation of the total number of students in different classes, etc. To understand the "Five-dimension Education" quality of each class through the query method-- displayed in the form of bar charts, pie charts, and line charts, so that the situation of each month and every semester can be seen by relevant persons at a glance. "Five-dimension Education" quality informatization evaluation includes the collective moral, intellectual, physical, and aesthetic work of the class.

4.2 The data demand design of "Five-dimension Education" quality assessment system for university classes

On the basis of the need for assessment information, the abstract data model or conceptual model is established according to the relationship between each assessment plate and additional plate. Scientific and reasonable employment of "Five-dimension Education" information uploaded by each student to integrate into a class and finally implement comprehensive assessment.

In this thesis, the quality assessment system of class "Five-dimension Education" can be seen from the following figure 1:

The "Five-dimension Education" quality evaluation system of class collectives has one-to-many and other types. Explaining based on big data analysis class "Five-dimension Education" quality assessment system design and implementation of the relationship between the main display data on the analysis of big data involved in the "Five-dimension Education" quality assessment system for class members. Every student participates in campus activities and other special tasks during school, as well as additional items such as volunteer service, competition awards, student certification, organization and youth leagues, and other outstanding deeds and contributions. By reviewing the materials, checking the supporting materials, calculating the scores according to the scoring standards, integrating the detailed information of each member of the class group, and displaying the data information of the "Five-dimension Education" quality assessment of the class group, which makes the comparison of different classes clear. The quality of "Five-dimension Education" is different for each student. They will happen in different time periods and different places, and then upload from time to time, so the "Five-dimension Education" of class collective members is saved. These records contain their "Five-dimension Education" quality information for a specific time period.
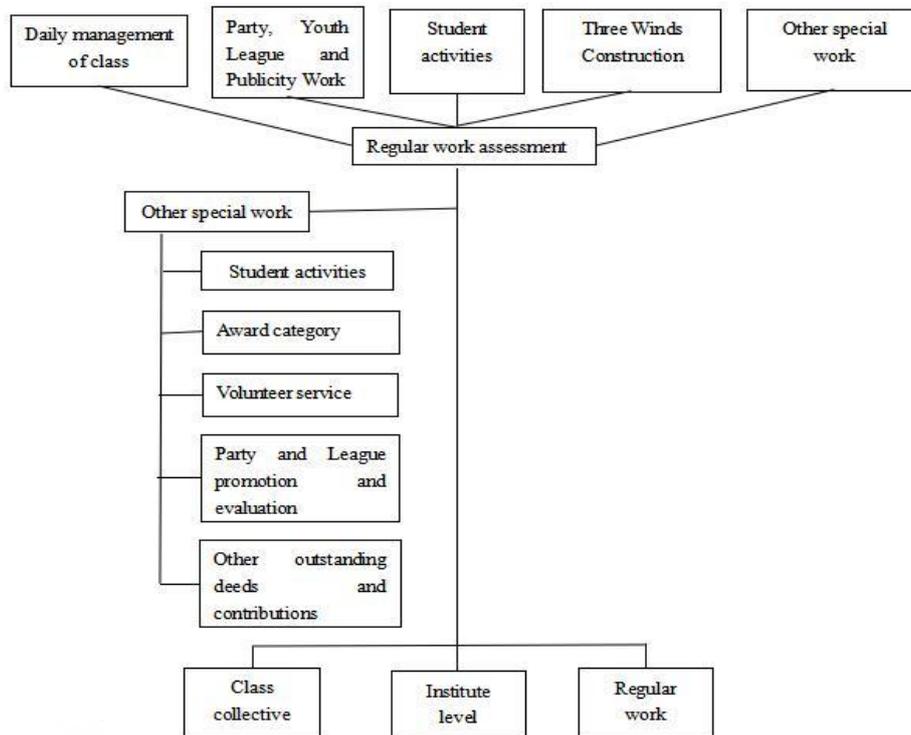
Figure 1: Class collective "Five-dimension Education" quality evaluation system

5. "Five-dimension Education"quality assessment system of university classes

5.1 Big data platform construction

"Five-dimension Education" comprehensive quality assessment system of university classes has been put into use. The server is placed in the school network center. Users in the campus can access the evaluation system through the LAN inside the campus network, and users in the external network can employ the browser to enter the website of the system to log in. After logging into the system from the external network, accounts with different identities have different permissions, and within the scope of permissions, you can view and export related information.

The "Five-dimension Education" quality comprehensive assessment system of university classes adopts B/S mode, making it convenient for users to query, to expand data and to maintain the system with fairly strong share ability. The system is developed by Java language; MySQL database is used for data management; Spark is used for big data processing, and Tomcat server is used for website. In this way, teachers, class members, ordinary users, and administrators can browse online on common browsers.

5.2 "Five-dimension Education" quality comprehensive data integration and data interface implementation of university classes

The Spark tool software in the big data environment is adopted for processing, and the data in the database is transformed into HDFS. Use Sqoop data transfer tool to import data from MySQL database to HDFS, and realize the compatibility of MySQL database and mainstream databases. For the video files generated by the "Five-dimension Education" quality behavior of the class members, the HDFS API interface is mobilized and stored in the HDFS file system, and Java code is written to operate the Hadoop API interface to realize data upload, download and delete, etc. For a large number of structured databases involved in the comprehensive evaluation of the "Five-dimension Education" quality of the class collective members, it is necessary to integrate all kinds of data and join the "Five-dimension Education" quality information sharing database of the class collective members. The "Five-dimension Education" quality system integrates and categorizes various data into the "Five-dimension Education" quality information sharing database of class members, and video data, etc. The data in the "Five-dimension Education" quality information sharing database of the class collective members are converted through Sqoop, and the relational database is transferred into the Hadoop HDFS file system. The data in the

HDFS file system is preprocessed, extracted and loaded by ETL, and the analysis and modeling of big data is realized with the help of Spark. The quality data integration and processing process of "Five-dimension Education" of class collective members is shown in the figure 2:
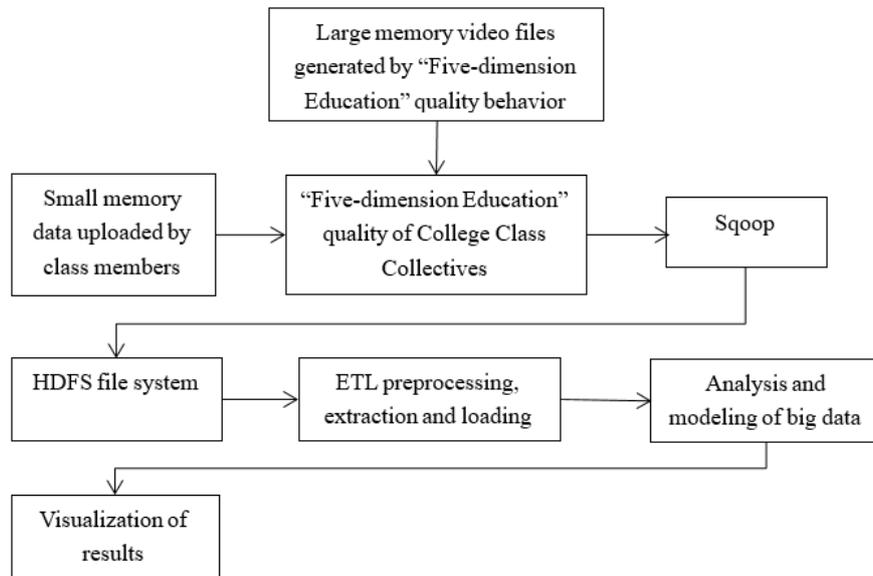

Figure 2: Data integration and processing flow of "Five-dimension Education" quality of class members

The evaluation system adopts the Java database connection technology to realize the data interface, and uses the Java language to write classes and interfaces that are independent of the database management system. The above technologies use the SQL language to realize the access and operation of the database, which is more convenient. To operate Mysql database using JDBC technology (Java database connection technology), you must first load the JDBC driver, establish connections with different databases, then send SQL language, process the returned results, and finally close the relevant connections. After the database is successfully connected, the execute method is used to carry out the SQL language, thereby completing the operation on the data.

5.3 Selection of development architecture

5.3.1 The back-end framework

At present, the mainstream development frameworks mainly include the Java-based SpringCloud framework, the Python-based Django framework and the Nodejs framework. Python and Nodejs are scripting languages, not object-oriented languages, and they were not designed for large internet applications. Java is naturally advantageous in code efficiency, code readability, replic ability of business architecture. Java technology stack basically covers all technical fields with rich and practical technical resources and solutions. Therefore, this study chooses SpringCloud architecture as the development framework of system background services.

5.3.2 The front frame

Currently, the most popular front-end frameworks are React, Vue and Angular. Vue adopts responsive data binding technology, which changes the front-end page development mode, making front-end development work more controllable and efficient. In addition, Vue is combined with Element components to form a set of front-end development ecological environment, which can be applied in many large Internet systems.

5.4 Database selection

Data is the core of the system. Nowadays, NoSQL databases and relational databases are two major types of database systems: ① Relational databases. Generally, the relational database in internet applications adopts the MySQL database. Compared with the Oracle database, the MySQL database has the advantages of free and low maintenance costs. In terms of internet applications, Oracle's advantages

are not significant, and the functions and performance of MySQL satisfy most internet applications. ② NoSQL database. System implementation, based on relational database, is very difficult to cope with rapid demand changes, and MongoDB can better solve the design problem of dynamic changes in relational database table structure.

5.5 Integration and processing of "Five-dimension Education" quality assessment data of university class collectives

Big data statistical analysis to achieve class members "Five-dimension Education" quality information statistical display, with the help of the "Five-dimension Education" quality comprehensive evaluation system of class members, the basic situation of the "Five-dimension Education" quality of the current class members can be very directly understood. Thus, a basic understanding of "Five-dimension Education" of the whole class will be achieved. Based on the data uploaded by the class members themselves, the system counts the number of people with different assessment contents and the situation in different time periods according to the knowledge of mathematical statistics, and generates corresponding histograms, line graphs and pie graphs. Through the statistics of the "Five-dimension Education" data information uploaded by members of the class, the uploaded information is stored in the system, and the file upload and download is realized through the Java File, and the javaMail program is written through the Servlet in the JSP, and the class collective members are uploaded and downloaded. The statistics of the "Five-dimension Education" quality information are sent to the relevant managers, so as to grasp the dynamics of the "Five-dimension Education" quality of the collective members of the class in time.

6. The function of "Five-dimension Education"quality information evaluation system design of university class collectives

6.1 Record collection and record authenticity guarantee function

The collective "Five-dimension Education" quality information evaluation system in colleges and universities is a tool platform for the "Five-dimension Education" quality education work of moral, intellectual, physical, aesthetic and labor, and it is the carrier of the implementation of educational concepts. This "Five-dimension Education" quality evaluation information system design and development is aimed at the problem of comprehensive quality education and evaluation, combined with the concept of process evaluation, the function of the system is designed, as shown in Figure 3.
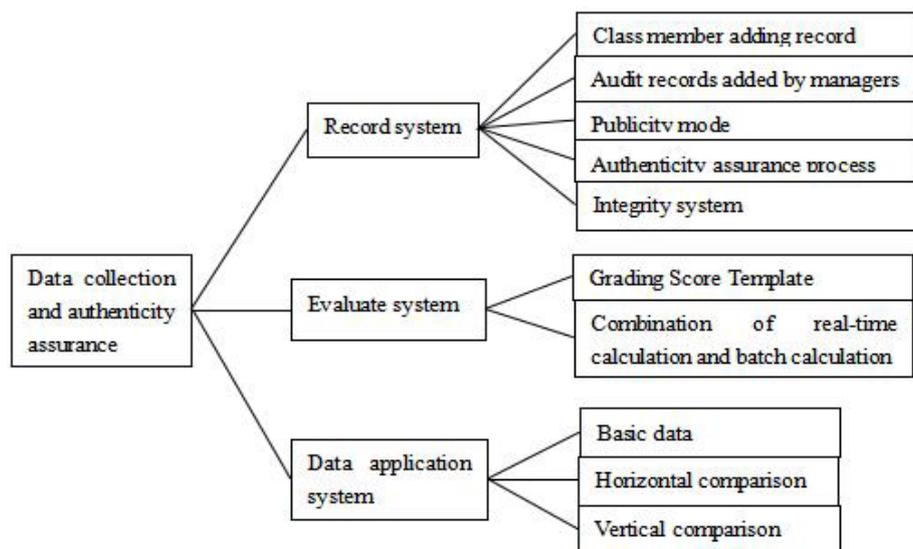

Figure 3: Data collection and authenticity assurance function display

6.1.1 Recording system

The functional design of the record system is mainly a collection of two sets of functions: record collection and authenticity assurance. Among them, the collection of records is divided into two types: the records added and uploaded by the class collective members and the assessment records added by the

managers, and the authenticity assurance mainly consists of publicity, challenge, arbitration, reconsideration, and adjudication.

(1) Add records of class collective members

Currently, the "drawer" framework is adopted for adding records of class collective members, that is, the two major modules of regular work items and additional items are used as "boxes", and the second-level indicator system (there are five indicators according to the routine assessment, mainly including the daily management of the class) is used as the "box"; CCP, the Communist Youth League, and publicity work; the construction of three styles; student activities; completion of other special work. And five indicators of additional projects, including volunteer service; excellent deeds and contributions.) is a "drawer", so that after the completion of the "Five-dimension Education" "Five-dimension Education" quality activity, the group members of the class can classify the activity records into different dimensions (secondary indicators). In terms of specific function design, the field collection of the two-level indicator system and dimensions adopts customized functions to meet the characteristic needs of comprehensive evaluation.

(2) Audit records added by managers

The assessment records added by the manager are divided into two types: the single dimension of class collective members and the single dimension of class collectives. Among them, the single dimension of group members is mainly used for individual cases or awards added by managers for a small number of members; the single dimension of class group is mainly used for the "Five-dimension Education" evaluation in which managers add a class group in batches. For example, the daily matters of the class collective; CCP, the Communist Youth League, and publicity work; the construction of the three styles; the batch evaluation of student activities, etc., can greatly reduce the burden of the assessment work, but at the same time it also brings the confusion of "swiping the screen"— teachers add dozens of records in batches at one time, which needs to be solved by adding the merge display function of filling in records in batches.

(3) Announcement mode

The non-private records of class collective members are uploaded, and after review, they need to be displayed to all members through public notice to ensure the authenticity of the records. There are two publicity modes in the "Five-dimension Education" quality evaluation: one is the centralized publicity mode, that is, it is publicized to everyone in a certain period of time; the other is the instant publicity mode, that is, the data is published immediately under the supervision of everyone after uploading.

(4) Authenticity guarantee process

Challenges are initiated by other members and can be challenged when members discover problems with other members' records. After the challenge is submitted, the school's arbitration team conducts arbitration, and after the arbitration is over, the arbitration opinion is given. According to the result of the arbitration, the losing organization has the right to file a reconsideration, and the school's reconsideration team can make a ruling, which is the final result.

(5) Integrity system

In terms of authenticity assurance, some matters can be completed by managers' review, which will virtually increase the workload of managers. And through a set of integrity systems consisting of publicity, challenge, arbitration, reconsideration and award, a set of effective authenticity guarantee methods can be formed, effectively reducing the burden on all parties. These designed functions not only ensure the authenticity of the uploaded data, but also cultivate the integrity and quality of the collective members of the class subtly.

6.1.2 Evaluation system

In order to solve the quantitative problem of process records, the development of this system mainly designs two groups of functions from the evaluation system:

(1) Grading and scoring template

The design of this system is based on dimension customization, and a score template is added. In the application practice, this system mainly realizes that the final grade of the class is composed of the monthly average score (60%) and the additional item score (40%). For this purpose, the collective "Five-dimension Education" quality evaluation information system for college classes Provides scoring template grading customization.

(2) Real-time computing combined with batch computing

The graded score template is convenient for the flexible application of the system, and can better cooperate with the school-university work, but it also brings about the trouble of massive calculation. When a student publishes a record, it will lead to four calculations (university-school-class-individual), and there are aggregation algorithms for each level of calculation. In order to solve this problem, this system proposes a way of combining real-time computing and batch computing, that is, large-scale computing at school level, college level, class and individual and peak-off-peak operation of user applications, at the same time to ensure the shortest time to catch up with the progress of the record.

6.1.3 Data application system

Data application is the ultimate goal of the class collective "Five-dimension Education" quality evaluation. In the application system, the system has designed four groups of analysis functions:

(1) Basic data

The basic data is to analyze the basic data for the node of a certain class group to obtain the overall results of the development of the "Five-dimension Education" quality education work of the group group.

(2) Horizontal comparison

The horizontal comparison is mainly the data comparison of different universities. On the one hand, it is convenient for the school level to grasp the work development of the college-level group, and on the other hand, it can form a healthy competition between the same level and promote the "Five-dimension Education" of the entire college. The development of quality work.

(3) Vertical comparison

The longitudinal comparison mainly reflects the changes based on time, including the comparison of ranking and basic data (total data, data recorded by modules and dimensions, etc.), which can be viewed by month or by semester.

(4) Group characteristics

Group characteristics are mainly presented through group indicators, including regular work items and additional items, including record distribution characteristics, hot spots, and long-term characteristics of distribution. Group characteristics can help managers to grasp the quality of the collective "Five-dimension Education" of college classes in more detail, and provide data reference for policy formulation of informatization evaluation.

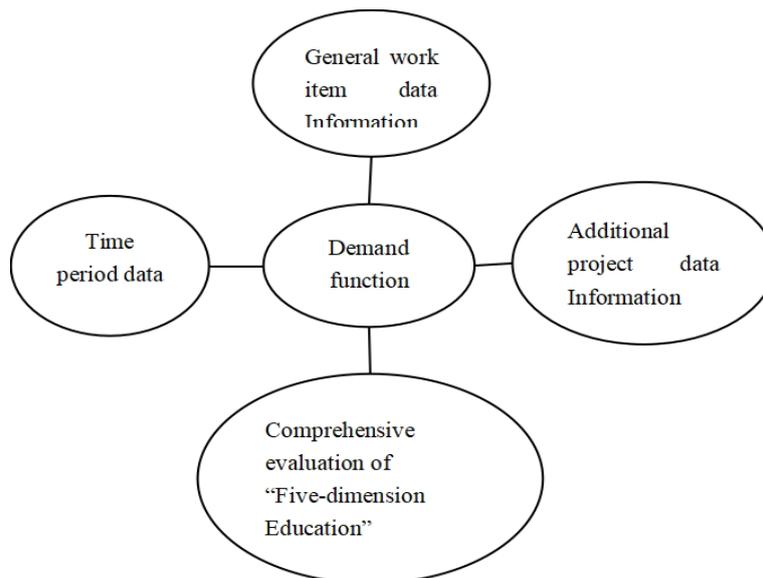### 6.2 Implement required functions

Figure 4: Demand Function Display

The functional requirement of the "Five-dimension Education" quality informatization evaluation system of the class collective is to realize the informatization of the "Five-dimension Education" quality

evaluation of the group members. The data source is the "Five-dimension Education" quality data formed by the daily life of the collective members of the college class. With the help of big data processing tools such as Hive and Spark, the statistical information of the "Five-dimension Education" quality of the college class collective is obtained, and other technologies to conduct a comprehensive evaluation of the college class collective, as shown in Figure 4.

6.2.1 "Five-dimension Education" quality statistical information analysis function of time period of university class collectives

Through the statistical analysis function of the relevant data uploaded by the class collective members, we can understand the three-level situation of "school-academy-class", the situation of each month, the quantitative indicators of collective moral, intellectual, physical, artistic and labor "Five-dimension Education", etc. The module provides a clearer understanding of the overall status of the current collective moral, intellectual, physical, and artistic labor "Five-dimension Education".

6.2.2 "Five-dimension Education" evaluation and assessment of routine work item information analysis function of class collectives

There are five first-level indicators for routine assessment items, mainly including daily management of the class; CPC, the Communist Youth League, and publicity work; construction of three styles; student activities; "Five-dimension Education" quality, understanding the routine work items of the "Five-dimension Education" quality evaluation and assessment of the class collective members can better reflect some of the rules of the class's collective "Five-dimension Education" evaluation and evaluation indicators. It is clearer that the main parameters of the collective "Five-dimension Education" quality index system of the class are improved.

6.2.3 Additional project data information analysis function

There are also five first-level indicators for additional projects. After reviewing the materials and supporting materials, add points according to the scoring criteria, including volunteer service; competition award-winning; student certification; recommendation and selection of the advanced; other outstanding deeds and contributions are one of the main parameters of "Five-dimension Education" quality information evaluation of university classes. Through the data uploaded by the class members, we can get a comprehensive understanding of the overall quality of the "Five-dimension Education" of the class.

6.2.4 "Five-dimension Education" quality evaluation comprehensive evaluation and analysis function of class collectives

The comprehensive evaluation and analysis function of the class collective "Five-dimension Education" quality evaluation is to comprehensively understand the "Five-dimension Education" quality of the class collective members through the information of the regular work assessment items and additional items uploaded by the class collective members, so as to assess the quality of the class collective- the college-school conducts a comprehensive evaluation to provide reference for the evaluation standards formulated by the school administrators and decision makers[4]. Class collective members, counselors, class teachers, leaders, and managers can view relevant information within the scope of their corresponding authority.

Acknowledgements

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